1855MNRAS..15..213C

"Still, it is believed that, notwithstanding the doubt which, to a certain extent, seems to rest on the results of the investigation, on account of the anomalous values deduced for the aberration and the parallax, considerable weight may still be attached to the value deduced for the nutation-constant, since, on the supposition of an unknown cause of error producing an inequality, having either an annual or a shorter period, its effect would be perfectly eliminated in so long a series of observations.

"The labour bestowed upon the investigation in the endeavour to produce the best possible result from the observations by applying rigorously the method of least squares, has been very great; and, as the whole of the calculations have been performed by myself, I regret much that the results have not proved so unexceptionable as to warrant the amount of care and labour expended. Still, a laborious work of this kind cannot be without its value; and it is hoped that additional scrutiny may afterwards throw some light upon the nature of the errors in the results of an investigation based upon observations made in an unexceptionable way, with an instrument faultless in theory, and pursued by processes combining all the modern refinements.

"For the present I leave this Paper in the hands of astronomers, with the hope that some one interested in the subject may be able to offer some elucidation of the difficulty thus presented.

"1855, *May* 30."

Results of Astronomical Observations made at the Observatory of the University, Durham, from October 1849 *to April* 1852, *under the general direction of the Rev. Temple Chevallier, B.D., F.R.A.S., Professor of Mathematics and Astronomy.* By R. C. Carrington, Esq., B.A., F.R.A.S., Observer in the University. 8vo. Durham, 1855.

In an Introduction, embracing sixteen pages, the author gives a description of the instruments and mode of observation pursued.

From October 1849 to the beginning of May 1850, the observations were almost exclusively meridional; thenceforward, with little exception, equatoreal. The objects observed in the meridian during 1849 and the spring of 1850 were, for the most part, stars from the Catalogue of the British Association, of which modern observations were wanted, the moon and moon-culminating stars, and the planets *Mars*, *Jupiter*, *Saturn*, *Uranus*, and *Neptune*. After April 1850, the objects were mainly such of the comparison stars used for the equatoreal as were not too faint for the transit telescope. The objects observed with the equatoreal were the planets *Pallas*, *Juno*, *Hebe*, *Iris*, *Flora*, *Metis*, *Hygeia*, *Parthenope*, *Victoria*, *Egeria*, *Irene*, and *Eunomia;* and the comets called Petersen's third, Bond's, D'Arrest's, Brorsen's fourth, and Encke's.

1855MNRAS..15..213C

The equatoreal observations were published provisionally from time to time in the *Monthly Notices* of this Society, and in the *Astronomische Nachrichten.* Their appearance in a definitive form was, however, delayed, in consequence of the transit-circle of the Durham Observatory being too small for observing the greater number of the comparison stars, and the necessity which therefore existed for obtaining those data from some other sources. The author, before his connexion with the university had ceased, offered to provide for this want as far as he was able, and to superintend the future revision and publication of the observations in a final form, as soon as the star-places were supplied. For a part of these he was indebted to the Astronomer Royal and Professor Piazzi Smyth; the others, or at least those which did not require reobservation, were determined by himself at the observatory which he subsequently erected at Redhill. The total number of comparison stars is 221.

The instruments of the observatory consisted of a small transit-circle of 3¼ in. aperture, and 4 feet 2 in. focal length; an astronomical clock, by Hardy; an 8-feet equatoreal by Fraunhofer; and a second equatoreal of 7 feet, presented by the late Duke of Northumberland; besides some smaller instruments not in actual use.

The Fraunhofer refractor with which the equatoreal observations were made had an aperture of 6½ in., and a focal length of 8 feet 3 in.

The first section of the work contains a catalogue of the mean places of stars deduced from observations made with the transit-circle. The second section exhibits the apparent positions of planets observed with the same instrument, and their comparison with the corresponding numbers given in the *Nautical Almanac.* The third section is devoted to observations of the moon and moon-culminating stars, also taken with the transit-circle. The fourth section contains the details of occultations of stars by the moon, observed with the Fraunhofer equatoreal, with the equations of condition deduced from them for the correction of the assumed elements computed according to the method of Professor Challis, given in the *Nautical Almanac* for 1854. The total number of occultations treated in this manner is sixteen. In the fifth section the author gives an account of the determination of the longitude of the observatory by the transmission of chronometers between Greenwich and Durham in the year 1851. The chronometers were conveyed twice to and from Greenwich by railway. The value of the longitude deduced from the first journey was $6^{m}\ 19^{s}{\cdot}79$ west; the corresponding result of the second journey was $6^{m}\ 19^{s}{\cdot}72$ west. The longitude definitively adopted was $6^{m}\ 19^{s}{\cdot}75$ west. From observations of the moon and moon-culminating stars, the author's predecessor had found the longitude to be $6^{m}\ 19^{s}{\cdot}1$ west.

The remaining sections are devoted to the equatoreal observations of the small planets and comets, and to the observations of the comparison stars used in conjunction with them. It is to this part of the work that the author more especially invites attention,

1855MNRAS..15..215.

under an impression that the final results may prove of some service in the correction of the orbits of the various bodies to which the observations relate.

On the Determination of the Difference of Longitude of the Royal Observatory, Greenwich, and the Harvard College Observatory, Cambridge, U.S.

(*Extracts of Letters from Mr. Bond of Harvard College Observatory, Cambridge, U.S., to Mr. Hartnup of the Liverpool Observatory.*)

"I have again to solicit your valuable assistance in the further prosecution of the expedition for determining the difference of longitude between this place and Greenwich. The results thus far obtained by means of chronometers prove so satisfactorily accordant that Dr. Bache, the Superintendent of the United States' Coast Survey, deems it expedient to continue our operations. With his permission I enclose you the results of the chronometer expeditions of 1849, 50, and 51, which have been recomputed by my son, Mr. G. P. Bond; the details are now nearly ready for publication, and will shortly be sent to press.

"The experience of former years has suggested some precautions and minute attentions, not heretofore, I believe, attended to in any similar expedition, which render it desirable to have your co-operation. If you feel disposed, and your other avocations will permit of an affirmative answer, it will afford me great pleasure.

"*March* 14, 1855."

"My son, Richard F. Bond, and Mr. Philip Sidney Coolidge, will go out to Liverpool on the first voyage, and we are very anxious to have everything previously arranged with the authorities of the Liverpool Custom-house, that there may be no delay in landing the chronometers at your observatory immediately on the arrival of the steamer in the Mersey. We have taken state-rooms in the steamer which is to sail from Boston on Wednesday, the 6th of June.

"A spring-governor, and electric clock for records, will accompany the chronometers; and it will be very desirable to have the temperature maintained as equable and as near that of the mean temperature to which they are exposed on the passage as possible. This being, probably, the last and a test expedition, we shall use every precaution to ensure correct data for the reductions.

"*May* 14, 1855."